Electronic Version
Stylesheet Version v1.1.1

Claims

[c1] A magnetic resonance imaging system comprising:
at least one superconducting magnet generating a static magnetic field;
a gradient coil assembly with an associated patient bore enclosure comprising at least one gradient coil generating at least one gradient magnetic field; and
at least one static field-shaping coil residing between said at least one superconducting magnet and said patient bore enclosure and supplementing said static magnetic field.

[c2] A system as in claim 1 wherein said at least one superconducting magnet resides within a cryostat having at least one thermal shield, said at least one static field-shaping coil resides between said at least one thermal shield and said patient bore enclosure.

[c3] A system as in claim 1 further comprising at least one gradient shield coil compensating for pulse sequences generated within the magnetic resonance imaging system.

[c4] A system as in claim 3 wherein said at least one gradient

shield coil resides between said at least one superconducting magnet and said gradient coil assembly.

[c5] A system as in claim 3 wherein said at least one static field-shaping coil resides between said at least one gradient shield coil and said patient bore enclosure.

[c6] A system as in claim 3 wherein said gradient coil assembly comprises said at least one gradient shield coil.

[c7] A system as in claim 1 further comprising a static field-shaping coil housing residing within a magnet structure of the magnetic resonance imaging system, said at least one static field-shaping coil residing within said static field-shaping coil housing.

[c8] A system as in claim 7 wherein said static field-shaping coil housing is formed of a material that prevents induction of eddy currents therein.

[c9] A system as in claim 7 wherein said static field-shaping coil housing is formed of a composite material.

[c10] A system as in claim 7 wherein said static field-shaping coil housing comprises a coolant.

[c11] A system as in claim 10 wherein said coolant is cooled via a cryocooler.

[c12] A system as in claim 1 wherein the magnetic resonance imaging system is of a cylindrical or open architecture design.

[c13] A system as in claim 1 wherein said at least one superconducting magnet comprises at least one low temperature superconductor.

[c14] A system as in claim 1 wherein said at least one superconducting magnet comprises at least one high temperature superconductor.

[c15] A system as in claim 1 wherein said at least one static field-shaping coil comprises at least one low temperature superconductor.

[c16] A system as in claim 1 wherein said at least one static field-shaping coil comprises at least one high temperature superconductor.

[c17] A system as in claim 1 wherein said at least one static field-shaping coil is unshielded from said at least one gradient magnetic field.

[c18] A system as in claim 1 wherein said at least one static field-shaping coil is inductively isolated from said at least one gradient coil assembly.

[c19] A system as in claim 1 wherein said at least one static

field-shaping coil is cooled using at least one of a cryogen bath, conduction, or convection.

[c20] A system as in claim 1 wherein said at least one static field-shaping coil is cooled via a coolant selected from at least one of helium, nitrogen, hydrogen, or neon.

[c21] A system as in claim 1 wherein said at least one static field-shaping coil is approximately a factor of ten smaller than said at least one superconducting magnet.

[c22] A system as in claim 1 wherein at least one of said at least one static field-shaping coil is replaced with an iron ring.

[c23] A system as in claim 1 wherein said at least one superconducting magnet resides at least partially within a first former and said at least one static field-shaping coil resides at least partially within a second former.

[c24] A magnetic resonance imaging system comprising:
at least one superconducting magnet generating a static magnetic field;
at least one gradient shield coil compensating for pulse sequences generated within the magnetic resonance imaging system;
a gradient coil assembly with an associated patient bore enclosure comprising at least one gradient coil generat-

ing at least one gradient magnetic field; and
at least one supplemental static field-shaping coil residing between said at least one superconducting magnet and said patient bore enclosure and increasing strength of said static magnetic field.

[c25] A system as in claim 24 wherein said at least one gradient shield coil resides between said at least one superconducting magnet and said gradient coil assembly.

[c26] A magnetic resonance imaging system comprising:
at least one superconducting magnet generating a static magnetic field;
at least one gradient shield coil compensating for pulse sequences generated within the magnetic resonance imaging system;
a gradient coil assembly with an associated patient bore enclosure comprising at least one gradient coil generating at least one gradient magnetic field in the patient bore; and
at least one supplemental static field-shaping coil residing between said at least one superconducting magnet and said patient bore enclosure, said at least one supplemental static field-shaping coil being unshielded from said at least one gradient magnetic field and increasing strength of said static magnetic field.

[c27] A system as in claim 26 wherein said at least one gradient shield coil resides between said at least one superconducting magnet and said gradient coil assembly.